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TC 2800 MAIL ROOM

Rule 192(c)(1) Real party of interest

Texas Instruments Incorporated owns the application.

Rule 192(c)(2) Related appeals and interferences

There are no dispositive related appeals or interferences.

Rule 192(c)(3) Status of claims

Claims 1-7 are pending in the application with all claims finally rejected. This appeal involves all finally rejected claims.

Rule 192(c)(4) Status of amendments

There is no amendment after final rejection.

Rule 192(c)(5) Summary of the invention

The invention provides a method of dielectric layer fabrication which includes flowing a catalyst such as ammonia over precursors for a dielectric material such as porous silicon dioxide. Figs. 1h-1j and application page 6, paragraph (8) describes the catalysis. Such a dielectric layer could be used for integrated circuit fabrication interlevel dielectric.

Rule 192(c)(6) Issues

The issues presented on appeal are:

(1) whether claims 1-7 are patentable over the Smith and Radhakrishnan references.

(2) whether claim 5 is indefinite.

Rule 192(c)(7) Grouping of the claims

The claims are treated as single group in each rejection.

Rule 192(c)(8) Argument

(1) Claims 1-7 were rejected as unpatentable over Smith in view of Radhakrishnan. The Examiner asserted that Smith (column 12, lines 10-23) discloses a dielectric layer formed with ammonia-based catalyst or precursor and cited Radhakrishnan column 4, various lines for making a dielectric (AlN) with water and ammonium hydroxide in a controlled atmosphere.

Appellants reply that the cited portion of Smith (column 12, lines 10-23) notes that ammonia is a good catalyst for the precursor layer but does not suggest any flowing of the catalyst over the precursor layer as required by claim 1.

And the portions of Radhakrishnan cited by the Examiner likewise do not suggest any flowing of a catalyst over a precursor layer. In fact, the cited portions of Radhakrishnan primarily describe cleaning a substrate prior to deposition of the dielectric layer and do not relate to dielectric layer formation. In particular, column 4, lines 35-60 describe the RCA standard semiconductor wafer cleaning which includes a hydrogen peroxide plus ammonium hydroxide solution. In contrast, Radhakrishnan column 4, lines 7-34 describe the dielectric layer formation by photolytic gas phase reaction of TMAA and ammonia to form AlN. There is no catalyst, rather the laser energy decomposes the TMAA and ammonia into reactants which combine to form the AlN. Thus Radhakrishnan has no suggestion of either a precursor layer or a catalyst. Consequently, Radhakrishnan does not combine with Smith. And the claims are patentable over the references.

(2) Claim 5 was rejected as indefinite. The Examiner asserted that the terms "periphery", "radial", and "central axis" should be simplified.

Appellants reply that such terms are understandable by one of ordinary skill in the art.

Rule 192(c)(9) Appendix

1. A dielectric layer fabrication method, comprising the steps of:
 - (a) applying a layer of dielectric precursor on a body;
 - (b) flowing a precursor reaction catalyst over said layer; and
 - (c) completing a precursor reaction to form a dielectric layer.
2. The method of claim 1, wherein:
 - (a) said catalyst of step (b) of claim 1 includes ammonia.
3. The method of claim 2, wherein:
 - (a) said catalyst of step (a) of claim 2 is a mixture of ammonia and water with a ratio of ammonia to water held constant in time.
4. The method of claim 3, wherein:
 - (a) said mixture of step (a) of claim 3 obtains from bubbling ammonia through a water solution of NH_4OH .
5. The method of claim 1, wherein:
 - (a) said body of step (a) of claim 1 is within a circular cylindrical chamber; and
 - (b) said flowing of step (b) of claim 1 is into said chamber at the circular periphery of said chamber, is radial over said precursor layer to a central axis, and is out of said chamber at said central axis.
6. The method of claim 1, wherein:
 - (a) said precursor of step (a) of claim 1 includes oligomers polymerized from silicon alkoxides.

7. The method of claim 1, wherein:

(a) said body of step (a) of claim 1 is within a chamber; and

(b) said flowing of step (b) of claim 1 flushes said chamber within a time interval in the range of 1 to 23 seconds.